

INCH-POUND
MIL-M-38510/322C
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SUPERSEDING
MIL-M-38510/322B
20 October 1982

MILITARY SPECIFICATION
MICROCIRCUITS, DIGITAL, BIPOLEAR, LOW-POWER SCHOTTKY TTL,
HEX BUS DRIVERS WITH 3 STATE OUTPUTS, MONOLITHIC SILICON

Inactive for new design after 18 April 1997.
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This specification is approved for use by all Departments
and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, low-power Schottky TTL, hex bus driver (3 state) microcircuits. Two product assurance classes and a choice of case outlines and lead finishes are provided for each type and are reflected in the complete part number. For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3).

1.2 Part number. The part number should be in accordance with MIL-PRF-38535, and as specified herein.

1.2.1 Device types. The device types should be as follows:

<u>Device type</u>	<u>Circuit</u>
01	Hex bus driver, gated enable inputs for x-y coincident bus control
02	Hex inverter bus driver, gated enable inputs for x-y coincident bus control
03	Hex bus driver, 4-line and 2-line enable inputs
04	Hex inverter bus driver, 4-line and 2-line enable inputs

1.2.2 Device class. The device class should be the product assurance level as defined in MIL-PRF-38535.

1.2.3 Case outlines. The case outlines should be as designated in MIL-STD-1835 and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-line
F	GDFP2-F16 or CDFP3-F16	16	Flat pack
X	CQCC2-N20	20	Square leadless chip carrier
2	CQCC1-N20	20	Square leadless chip carrier

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAS, P. O. Box 3990, Columbus, OH 43216-5000, by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

1.3 Absolute maximum ratings.

Supply voltage range	-0.5 V to 7.0 V
Input voltage range	-1.5 V to 7.0 V
Storage temperature range	-65° to +150°C
Maximum power dissipation (P_D) <u>1/</u>	
Device types 01 and 03	132 mW
Device type 02 and 04	116 mW
Lead temperature (soldering, 10 seconds)	300°C
Thermal resistance, junction to case (θ_{JC}):	
Cases E, F, X, and 2	(See MIL-STD-1835)
Junction temperature (T_J) <u>2/</u>	+175°C

1.4 Recommended operating conditions.

Supply voltage (V_{CC})	4.5 V minimum to 5.5 V maximum
Minimum high level input voltage (V_{IH})	2.0 V
Maximum low level input voltage (V_{IL})	0.7 V
Normalized fanout (each output) <u>3/</u>	20 maximum
Case operating temperature range (T_C)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and Standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Departments of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

DEPARTMENT OF DEFENSE

MIL-PRF-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for.

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Method Standard for Microelectronics.
 MIL-STD-1835 - Interface Standard Electronic Component Case Outlines

(Unless otherwise indicated, copies of the above specifications and standards are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

1/ Must withstand the added P_D due to short-circuit test (e.g., I_{OS}).

2/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening conditions in accordance with MIL-PRF-38535.

3/ The device will fan out in both high and low levels to the specified number of inputs for the same device type as that being tested.

3. REQUIREMENTS

3.1 Qualification. Microcircuits furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.3 and 6.4).

3.2 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535 and as specified herein or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein.

3.3.1 Terminal connections and logic diagrams. The terminal connections and logic diagrams shall be as specified on figure 1.

3.3.2 Truth table. The truth table shall be as specified on figure 2.

3.3.3 Schematic circuits. The schematic circuits shall be maintained by the manufacturer and made available to the qualifying activity and the preparing activity upon request.

3.3.4 Case outlines. The case outlines shall be as specified in 1.2.3.

3.4 Lead material and finish. The lead material and finish shall be in accordance with MIL-PRF-38535 (see 6.6).

3.5 Electrical performance characteristics. The electrical performance characteristics are as specified in table I, and apply over the full recommended case operating temperature range, unless otherwise specified.

3.6 Electrical test requirements. The electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

3.7 Marking. Marking shall be in accordance with MIL-PRF-38535.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 9 (see MIL-PRF-38535, appendix A).

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not effect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38535 and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

- a. The burn-in test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.
- b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.
- c. Additional screening for space level product shall be as specified in MIL-PRF-38535, appendix B.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-38535.

4.4 Technology Conformance Inspection (TCI). Technology conformance inspection shall be in accordance with MIL-PRF-38535 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table III of MIL-PRF-38535 and as follows:

- a. Tests shall be as specified in table II herein.
- b. Subgroups 4, 5, 6, 7, and 8 shall be omitted.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II MIL-PRF-38535.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table IV of MIL-PRF-38535 and as follows:

- a. End-point electrical parameters shall be as specified in table II herein.
- b. The steady-state life test duration, test condition, and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document control by the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535. End-point electrical parameters shall be as specified in table II herein.

4.5 Methods of inspection. Methods of inspection shall be specified and as follows:

4.5.1 Voltage and current. All voltages given are referenced to the microcircuit ground terminal. Currents given are conventional and positive when flowing into the referenced terminal.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55^{\circ}\text{C} \leq T_{\text{C}} \leq +125^{\circ}\text{C}$	Device type	Limits		Unit
				Min	Max	
High level output voltage	V_{OH}	$V_{\text{CC}} = 4.5 \text{ V}$, $V_{\text{IN}} = 0.7 \text{ V}$ or 2.0 V , $I_{\text{OH}} = -1 \text{ mA}$	All	2.4		V
Low level output voltage	V_{OL}	$V_{\text{CC}} = 4.5 \text{ V}$, $V_{\text{IN}} = 2.0 \text{ V}$ or 0.7 V , $I_{\text{OL}} = 12 \text{ mA}$	All		0.4	V
Input clamp voltage	V_{IC}	$V_{\text{CC}} = 4.5 \text{ V}$, $I_{\text{IN}} = -18 \text{ mA}$, $T_{\text{C}} = +25^{\circ}\text{C}$	All		-1.5	V
High level input current	I_{IH1}	$V_{\text{CC}} = 5.5 \text{ V}$, $V_{\text{IN}} = 2.7 \text{ V}$	All		20	μA
	I_{IH2}	$V_{\text{CC}} = 5.5 \text{ V}$, $V_{\text{IN}} = 7.0 \text{ V}$	All		0.1	mA
Inhibited state output Leakage current	I_{O1}	$V_{\text{CC}} = 5.5 \text{ V}$, $V_{\text{IN}} = 2.0 \text{ V}$, $V_{\text{OUT}} = 2.4 \text{ V}$	All		20	μA
	I_{O2}	$V_{\text{CC}} = 5.5 \text{ V}$, $V_{\text{IN}} = 2.0 \text{ V}$, $V_{\text{OUT}} = 0.4 \text{ V}$	All		-20	μA
Low level input current at A input	I_{IL1}	$V_{\text{CC}} = 5.5 \text{ V}$, $V_{\text{IN}} = 0.4 \text{ V}$ \bar{E} inputs at 0.4 V	All	0	-400	μA
Low level input current at \bar{E} input	I_{IL2}	$V_{\text{CC}} = 5.5 \text{ V}$, $V_{\text{IN}} = 0.4 \text{ V}$,	All	-1.0	-400	μA
Short circuit output current	I_{OS}	$V_{\text{CC}} = 5.5 \text{ V}$ <u>1/</u>	All	-15	-225	mA
Supply current	I_{CC}	$V_{\text{CC}} = 5.5 \text{ V}$	01		24	mA
			02		21	
			03		24	
			04		21	
Propagation delay time (low to high level output)	t_{PLH}	$V_{\text{CC}} = 5.0 \text{ V}$ $R_{\text{L}} = \text{See figure 3}$ $C_{\text{L}} = 50 \text{ pF}$	01	2	21	ns
			02	2	20	
			03	2	21	
			04	2	20	
Propagation delay time (high to low level output)	t_{PHL}	$V_{\text{CC}} = 5.0 \text{ V}$ $R_{\text{L}} = \text{See figure 3}$ $C_{\text{L}} = 50 \text{ pF}$	01	2	29	ns
			02	2	23	
			03	2	29	
			04	2	23	
Propagation delay time (disabled to high level output)	t_{PZH}	$V_{\text{CC}} = 5.0 \text{ V}$ $R_{\text{L}} = \text{See figure 3}$ $C_{\text{L}} = 50 \text{ pF}$	01	2	45	ns
			02	2	45	
			03	2	45	
			04	2	45	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55^{\circ}\text{C} \leq T_{\text{C}} \leq +125^{\circ}\text{C}$	Device type	Limits		Unit
				Min	Max	
Propagation delay time (high level to disabled output)	t_{PHZ}	$V_{\text{CC}} = 5.0 \text{ V}$ $R_{\text{L}} = \text{See figure 3}$ $C_{\text{L}} = 50 \text{ pF}$	01	2	39	ns
			02	2	42	
			03	2	39	
			04	2	42	
Propagation delay time (disabled to low level output)	t_{PZL}	$V_{\text{CC}} = 5.0 \text{ V}$ $R_{\text{L}} = \text{See figure 3}$ $C_{\text{L}} = 50 \text{ pF}$	01	2	52	ns
			02	2	58	
			03	2	52	
			04	2	58	
Propagation delay time (low level to disabled output)	t_{PLZ}	$V_{\text{CC}} = 5.0 \text{ V}$ $R_{\text{L}} = \text{See figure 3}$ $C_{\text{L}} = 50 \text{ pF}$	01	2	45	ns
			02	2	45	
			03	2	45	
			04	2	45	

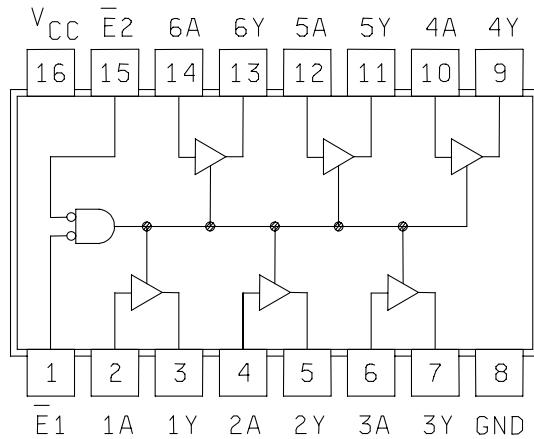
1/ Not more than one output should be shorted at a time.

TABLE II. Electrical test requirements.

MIL-PRF-38535 test requirements	Subgroups (see table III)	
	Class S devices	Class B devices
Interim electrical parameters	1	1
Final electrical test parameters	1*, 2, 3, 9, 10, 11	1*, 2, 3, 9
Group A test requirements	1, 2, 3, 9, 10, 11	1, 2, 3, 9, 10, 11
Group B electrical test parameters test when using the method 5005 QCI option	1, 2, 3, 9, 10, 11	N/A
Group C end-point electrical parameters	1, 2, 3, 9, 10, 11	1, 2, 3
Group D end-point electrical parameters	1, 2, 3	1, 2, 3

*PDA applies to subgroup 1.

DEVICE TYPE 01
CASES E AND F



DEVICE TYPE 02
CASES E AND F

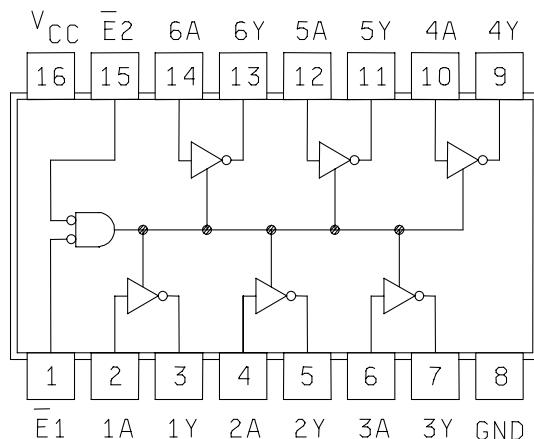


FIGURE 1. Terminal connections and logic diagram – top view.

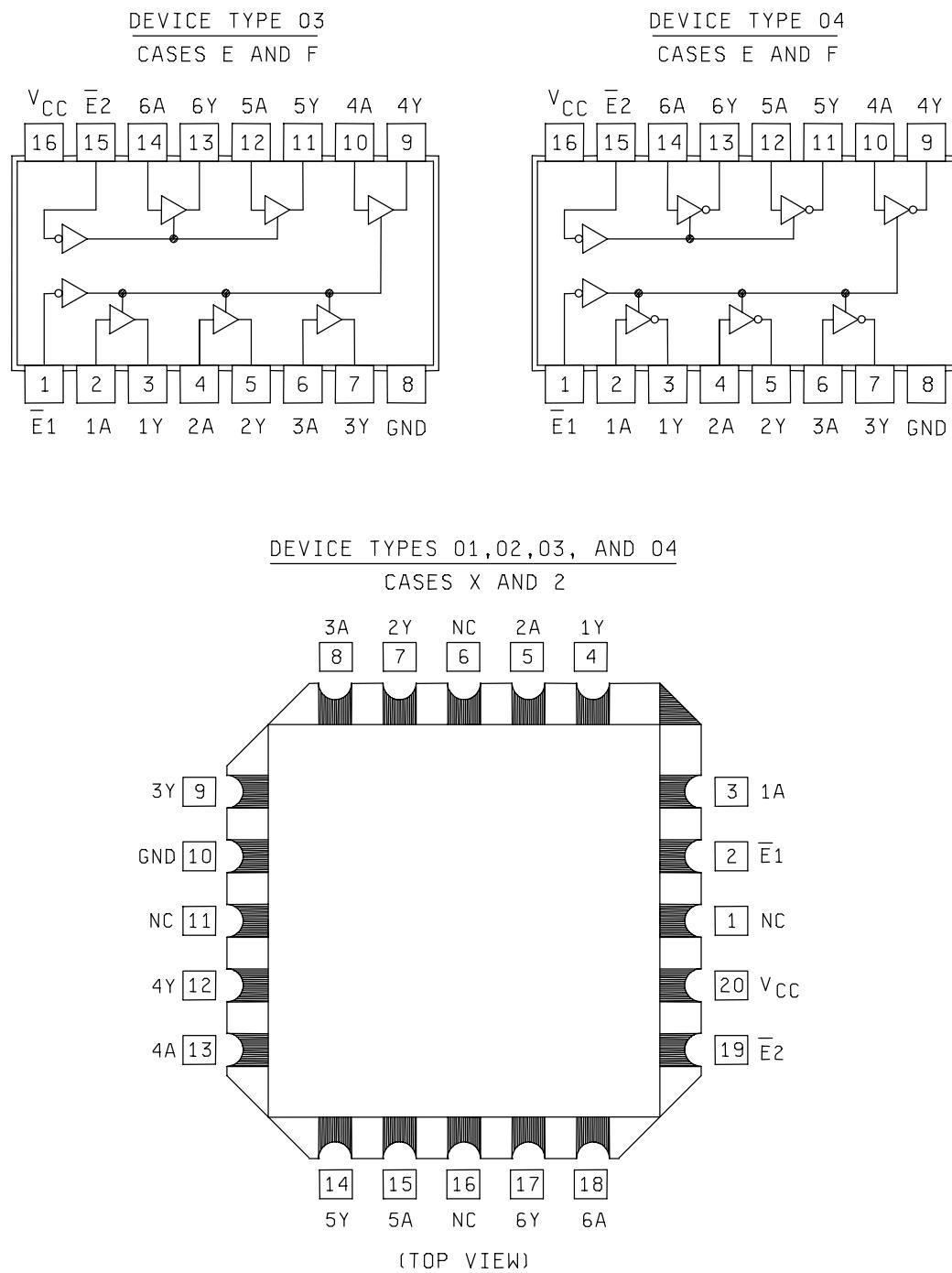


FIGURE 1. Terminal connections and logic diagram – top view – Continued.

Device type 01

Inputs		Outputs	
$\bar{E} 1$	$\bar{E} 2$	A	Y
H	X	X	Z
X	H	X	Z
L	L	H	H
L	L	L	L

Device type 02

Inputs		Outputs	
$\bar{E} 1$	$\bar{E} 2$	A	Y
H	X	X	Z
X	H	X	Z
L	L	H	L
L	L	L	H

Device type 03

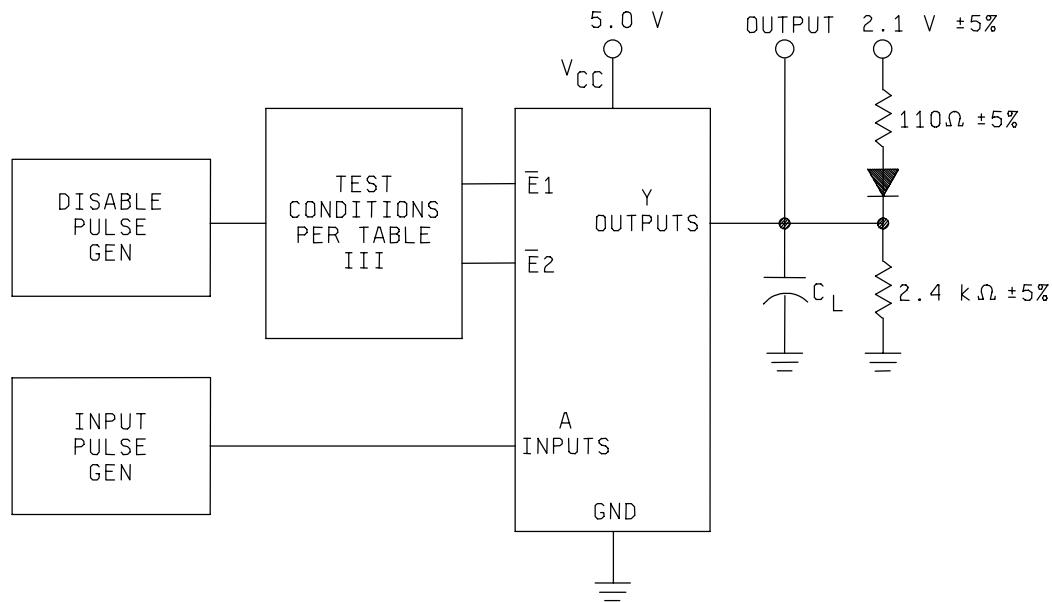
Inputs		Outputs	
$\bar{E} 1$	A	Y	
H	X	Z	
L	H	H	
L	L	L	

Device type 04

Inputs		Outputs	
$\bar{E} 1$	A	Y	
H	X	Z	
L	H	L	
L	L	H	

H = high level
 L = low level
 X = irrelevant
 Z = High impedance

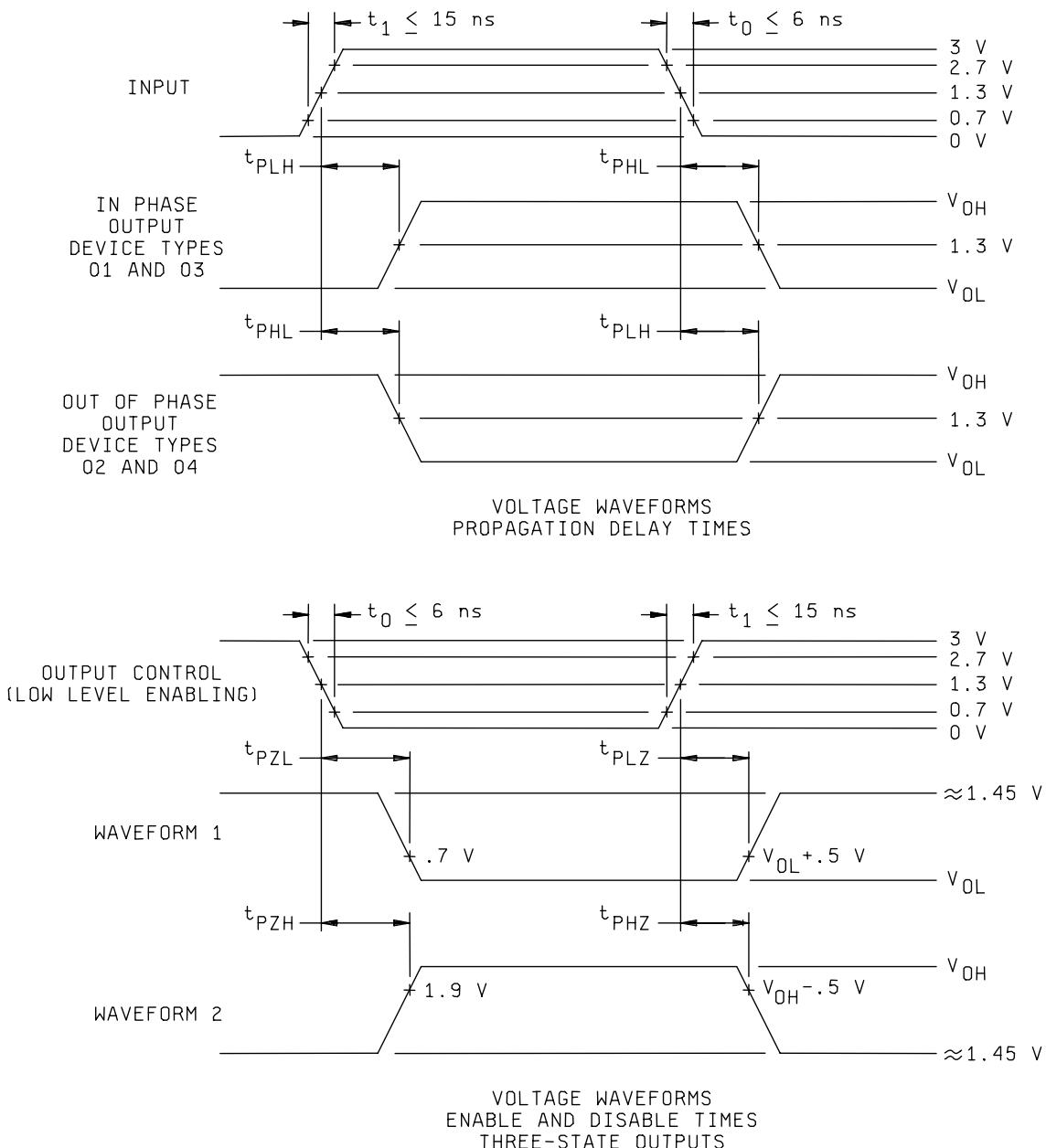
FIGURE 2. Truth table (each driver).

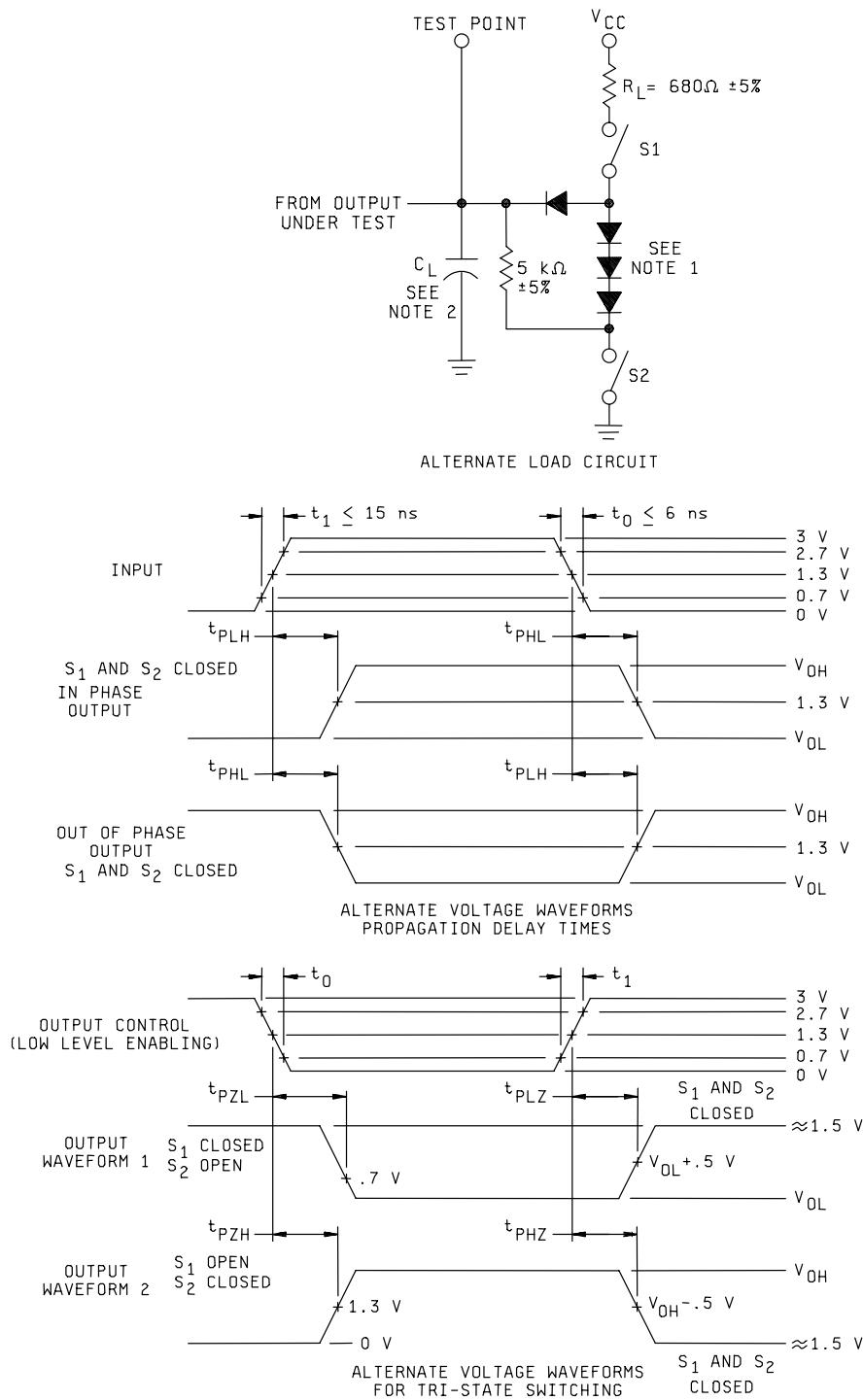


NOTES:

1. $C_L = 50 \text{ pF} \pm 10\%$ including jig and probe capacitance.
2. All diodes are 1N3064 or equivalent.

FIGURE 3. Switching time test circuit and waveforms.

FIGURE 3. Switching time test circuit and waveforms - Continued.

**NOTES:**

1. Diodes are 1N3064 or equivalent.
2. $C_L = 50 \text{ pF} \pm 10\%$ for t_{PLH} , t_{PHL} , t_{PZL} , and t_{PZH} ; $C_L = 15 \text{ pF}$ minimum for t_{PHZ} and t_{PLZ} . C_L includes probe and jig capacitance.

FIGURE 3. Switching time test circuit and waveforms - Continued.

TABLE III. Group A inspection for device type Q1 - Continued.

		Terminal conditions (pins not designated may be high $\geq 2.0\text{ V}$; low $\leq 0.7\text{ V}$; or open).																		
Subgroup	Symbol	MIL-STD-883 Cases E/F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Limits	Unit
10	t_{PH}	Cases 2, X $\bar{2}$	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20	Measured terminal	
$T_C = 125^\circ\text{C}$	Fig. 3	Test no.	$\bar{E} 1$	1A	1Y	2A	2Y	3A	3Y	GND	4Y	4A	5Y	5A	6Y	6A	$\bar{E} 2$	V_{CC}	Min Max	ns
	3003	92	GND	$\bar{3}'$	OUT	$\bar{3}'$	OUT	"	"	GND	"	"	"	"	"	GND	5.0 V	1A - 1Y	2	21
	"	93	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2A - 2Y	"	"	"
	"	94	"	"	"	"	"	"	"	"	"	"	"	"	"	"	3A - 3Y	"	"	"
	"	95	"	"	"	"	"	"	"	"	"	"	"	"	"	"	4A - 4Y	"	"	"
	"	96	"	"	"	"	"	"	"	"	"	"	"	"	"	"	5A - 5Y	"	"	"
	"	97	"	"	"	"	"	"	"	"	"	"	"	"	"	"	6A - 6Y	"	"	"
	t_{PHL}	"	98	"	$\bar{3}'$	OUT	"	"	"	"	"	"	"	"	"	"	1A - 1Y	"	29	"
		"	99	"	"	"	"	"	"	"	"	"	"	"	"	"	2A - 2Y	"	"	"
		"	100	"	"	"	"	"	"	"	"	"	"	"	"	"	3A - 3Y	"	"	"
		"	101	"	"	"	"	"	"	"	"	"	"	"	"	"	4A - 4Y	"	"	"
		"	102	"	"	"	"	"	"	"	"	"	"	"	"	"	5A - 5Y	"	"	"
		"	103	"	"	"	"	"	"	"	"	"	"	"	"	"	6A - 6Y	"	"	"
	t_{PHH}	"	104	$\bar{4}'$	4.5 V	OUT	"	"	"	"	"	"	"	"	"	"	$\bar{E} 1 - 1Y$	"	45	"
	t_{PHL}	"	105	GND	"	"	"	"	"	"	"	"	"	"	"	"	$\bar{E} 2 - 1Y$	"	52	"
	t_{PHZ}	"	106	$\bar{4}'$	4.5 V	"	"	"	"	"	"	"	"	"	"	"	GND	"	39	"
	t_{PLZ}	"	107	$\bar{4}'$	GND	"	"	"	"	"	"	"	"	"	"	"	$\bar{E} 1 - 1Y$	"	45	"
11	Same tests, terminal conditions and limits as for subgroup 10, except $T_c = -55^\circ\text{C}$.																			

$\frac{1}{2}'$ I_{IL} limits (μA) min/max values for circuits are shown below.
 $\frac{2}{2}'$ I_{OS} limits (mA) min/max values for circuits are shown below.

Parameter	Terminals	Circuits					
		A	B	C	D	E	F
I_{IL1}	1A, 2A, 3A, 4A, 5A, 6A	-150/-380	-30/-300	-160/-400	-160/-400	-160/-400	0/-200
I_{IL2}	$\bar{E} 1, \bar{E} 2$	-1.0/-150	-30/-300	-160/-400	-160/-400	-160/-400	-150/-380
I_{OS}	1Y, 2Y, 3Y, 4Y, 5Y, 6Y	-40/-225	-30/-130	-40/-225	-15/-100	-30/-130	-15/-100

$\frac{3}{2}'$ Pulse from input pulse generator.

$\frac{4}{2}'$ Pulse from disable generator.

$\frac{5}{2}'$ For cases 2 and X, pins not referenced are NC.

TABLE III. Group A inspection for device type 02.
Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits	Unit			
			Cases 2, X, 5/ \bar{Y}	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20						
$T_c = 125^\circ C$	t_{fPHL}	Test no.	$\bar{E} 1$	1A	1Y	2A	2Y	3A	3Y	GND	4Y	4A	5Y	5A	6Y	6A	$\bar{E} 2$	V_{CC}	GND	5.0 V	1A-1Y	2	20	ns	
		3003	92	GND	3/ \bar{Y}	OUT				GND										"	2A-2Y	"	"	"	n
		"	94	"						3/ \bar{Y}	OUT									"	3A-3Y	"	"	"	n
		"	95	"							OUT									"	4A-4Y	"	"	"	n
		"	96	"								OUT								"	5A-5Y	"	"	"	n
		"	97	"									OUT							"	6A-6Y	"	"	"	n
		"	98	"	3/ \bar{Y}	OUT														"	1A-1Y	"	"	"	23
		"	99	"						3/ \bar{Y}	OUT									"	2A-2Y	"	"	"	n
		"	100	"							OUT									"	3A-3Y	"	"	"	n
		"	101	"								OUT								"	4A-4Y	"	"	"	n
$T_c = -55^\circ C$	t_{fPHL}		102	"								OUT							GND	"	5A-5Y	"	"	"	n
			"	103	"								OUT							"	6A-6Y	"	"	"	n
			"	104	4/ \bar{Y}	GND	OUT													"	1A-1Y	"	"	"	45
			"	105	GND	4.5V	"													"	2A-2Y	"	"	"	n
			"	106	4/ \bar{Y}	GND	"													"	3A-3Y	"	"	"	n
			"	107	4/ \bar{Y}	4.5V	"													"	4A-4Y	"	"	"	58
			"	108	4/ \bar{Y}	4.5V	"													"	5A-5Y	"	"	"	42
11																			GND	"	6A-6Y	"	"	"	n
																				"	1A-1Y	"	"	"	n
																				"	2A-2Y	"	"	"	n

1/ I_L limits (μA) min/max values for circuits are shown below.
2/ I_{OS} limits (mA) min/max values for circuits are shown below.

Parameter	Terminals	Circuits						F
		A	B	C	D	E	F	
I_{LL1}	1A, 2A, 3A, 4A, 5A, 6A	-150/-380	-30/-300	-160/-400	-160/-400	-160/-400	-160/-400	-150/-380
I_{LL2}	$\bar{E} 1$, $\bar{E} 2$	-1.0/-150	-30/-300	-160/-400	-160/-400	-160/-400	-160/-400	-150/-380
I_{OS}	1Y, 2Y, 3Y, 4Y, 5Y, 6Y	-40/-225	-30/-130	-40/-225	-40/-225	-15/-100	-30/-130	-15/-100

3/ Pulse from input generator.

4/ Pulse from disable generator.

5/ For cases 2 and X, pins not referenced are NC.

TABLE III. Group A inspection for device type 03.
Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits	Unit
			Cases 2, X, 5/ \bar{Y}	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20			
$T_C = 25^\circ\text{C}$	t_{fPHL}	Test no.	$\bar{E} 1$	1A	1Y	2A	2Y	3A	3Y	GND	4Y	4A	5Y	5A	6Y	6A	$\bar{E} 2$	5.0 V	1A-1Y	2	21	ns
			92	GND	3/ \bar{Y}	OUT				GND									2A-2Y	n	n	
		Fig. 3	93	"					3/ \bar{Y}	OUT	"								3A-3Y	"	"	n
			94	"															4A-4Y	"	"	n
			95	"															5A-5Y	"	"	n
			96	"															GND	"	"	n
			97	"															GND	"	"	n
			98	GND	3/ \bar{Y}	OUT													6A-6Y	"	"	n
			99	"					3/ \bar{Y}	OUT	"								1A-1Y	"	29	n
			100	"															2A-2Y	"	"	n
	t_{fPL}		101	"															3A-3Y	"	"	n
			102	"															4A-4Y	"	"	n
			103	"															5A-5Y	"	"	n
			104	4/ \bar{I}	4.5 V	OUT													6A-6Y	"	"	n
			105	4/ \bar{I}	GND	"													1A-1Y	"	45	n
			106	4/ \bar{I}	4.5 V	"													1A-1Y	"	52	n
			107	4/ \bar{I}	GND	"													1A-1Y	"	39	n
			108	4/ \bar{I}	GND	"													1A-1Y	"	45	n
			109	4/ \bar{I}	GND	"													1A-1Y	"	45	n
			110	4/ \bar{I}	GND	"													1A-1Y	"	45	n

11 Same tests, terminal conditions and limits as for subgroup 10, except $T_C = 55^\circ\text{C}$.

1/ \bar{Y} limits (μA) min/max values for circuits are shown below.
2/ \bar{Y} limits (mA) min/max values for circuits are shown below.

Parameter	Terminals	Circuits					
		A	B	C	D	E	F
I_{LL1}	1A, 2A, 3A, 4A, 5A, 6A	-150/-380	-30/-300	-160/-400	-160/-400	-160/-400	0/-200
I_{LL2}	$\bar{E} 1, \bar{E} 2$	-1.0/-150	-30/-300	-160/-400	-160/-400	-160/-400	-150/-380
I_{OS}	1Y, 2Y, 3Y, 4Y, 5Y, 6Y	-40/-225	-30/-130	-40/-225	-15/-100	-30/-130	-15/-100

3/ Pulse from input pulse generator.

4/ Pulse from disable generator.

5/ For cases 2 and X, pins not referenced are NC.

TABLE III. Group A inspection for device type 04.
Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

Subgroup	Symbol	MIL-STD-883 method	Cases E, F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Measured terminal	Limits	Unit
			Cases 2, X, 5/	2	3	4	5	7	8	9	10	12	13	14	15	17	18	19	20			
$T_c = 125^\circ C$	t_{pH}	3003 Fig. 3	92	GND	$\bar{E} 1$	1A	1Y	2A	2Y	3A	3Y	GND	4Y	4A	5Y	5A	6Y	6A	$\bar{E} 2$	V _{CC}	5.0 V	
		"	94	"	"	"	"	"	"	"	"	GND	"	"	"	"	"	"	"	2A - 2Y	"	ns
		"	95	"	"	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	3A - 3Y	"	"
		"	96	"	"	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	4A - 4Y	"	"
		"	97	"	"	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	5A - 5Y	"	"
		"	98	GND	$\bar{3}/$	OUT	"	"	"	"	"	"	"	"	"	"	"	"	GND	"	"	
		"	99	"	"	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	6A - 6Y	"	"
		"	100	"	"	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	1A - 1Y	"	23 n
		"	101	"	"	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	2A - 2Y	"	"
		"	102	"	"	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	3A - 3Y	"	"
$T_c = 55^\circ C$	t_{pZH}	"	103	"	"	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	4A - 4Y	"	"
		"	104	$\bar{4}/$	GND	OUT	"	"	"	"	"	OUT	"	"	"	"	"	"	"	5A - 5Y	"	"
		"	105	$\bar{4}/$	4.5 V	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	6A - 6Y	"	"
		"	106	$\bar{4}/$	GND	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	1A - 1Y	"	45 n
		"	107	$\bar{4}/$	4.5 V	"	"	"	"	"	"	OUT	"	"	"	"	"	"	"	2A - 2Y	"	"
11																				3A - 3Y	"	"

Same tests, terminal conditions and limits as for subgroup 10, except $T_c = 55^\circ C$.

$\bar{1}/$ I_L limits (μA) min/max values for circuits are shown below.
 $\bar{2}/$ I_{OS} limits (mA) min/max values for circuits are shown below.

Parameter	Terminals	Circuits						F
		A	B	C	D	E	F	
I_{L1}	1A, 2A, 3A, 4A, 5A, 6A	-150/-380	-30/-300	-160/-400	-160/-400	-160/-400	-150/-380	
I_{L2}	$\bar{E} 1, \bar{E} 2$	-1.0/-150	-30/-300	-160/-400	-160/-400	-160/-400	-150/-380	
I_{OS}	1Y, 2Y, 3Y, 4Y, 5Y, 6Y	-40/-225	-30/-130	-40/-225	-15/-100	-30/-130	-15/-100	

$\bar{3}/$ Pulse from input pulse generator.

$\bar{4}/$ Pulse from disable generator.

$\bar{5}/$ For cases 2 and X, pins not referenced are NC.

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department of Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of the specification.
- b. Complete part number (see 1.2).
- c. Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.
- d. Requirements for certificate of compliance, if applicable.
- e. Requirements for notification of change of product or process to contracting activity in addition to notification to the qualifying activity, if applicable.
- f. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action, and reporting of results, if applicable.
- g. Requirements for product assurance options.
- h. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements should not affect the part number. Unless otherwise specified, these requirements will not apply to direct purchase by or direct shipment to the Government.
- j. Requirements for "JAN" marking.

6.3 Superseding information. The requirements of MIL-M-38510 have been superseded to take advantage of the available Qualified Manufacturer Listing (QML) system provided by MIL-PRF-38535. Previous references to MIL-M-38510 in this document have been replaced by appropriate references to MIL-PRF-38535. All technical requirements now consist of this specification and MIL-PRF-38535. The MIL-M-38510 specification sheet number and PIN have been retained to avoid adversely impacting existing government logistics systems and contractor's parts lists.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-38535 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DSCC-VQ, 3990 E. Broad Street, Columbus, Ohio 43123-1199.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535, MIL-HDBK-1331, and as follows:

GND	Electrical ground (common terminal).
V _{IN}	Voltage level at an input terminal.
V _{IC}	Input clamp voltage
I _{IN}	Current flowing into an input terminal.
t _{PHZ}	Output disable time (of a three state output) from high level. The time between the specified reference points on the input and output voltage waveforms with the three state output changing from the defined high level to a high impedance (off) state.
t _{PLZ}	Output disable time (of a three state output) from low level. The time between the specified reference points on the input and output voltage waveforms with the three state output changing from the defined low level to a high impedance (off) state.
t _{PZH}	Output enable time (of a three state output) to high level. The time between the specified reference points on the input and output voltage waveforms with the three state output changing from a high impedance (off) state to the defined high level.
t _{PZL}	Output enable time (of a three state output) to low level. The time between the specified reference points on the input and output voltage waveforms with the three state output changing from a high impedance (off) state to the defined low level.
T _C	Case temperature

6.6 Logistic support. Lead materials and finishes (see 3.4) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number.

6.7 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variations in relation to case size. The presence of this information should not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-PRF-38535.

Military device type	Generic-industry type
01	54LS365
02	54LS366
03	54LS367
04	54LS368

6.8 Manufacturers' designations. Manufacturers' circuits included in this specification are designated as shown in table IV.

TABLE IV. Manufacturer's designation.

Device type	CIRCUITS					
	Texas Instruments	Signetics Corp.	Motorola Inc.	Raytheon Company	Fairchild Semiconductor	National Semiconductor
01	A	B	C	D	E	F
02	A	B	C	D	E	F
03	A	B	C	D	E	F
04	A	B	C	D	E	F

6.9 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:

Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

(Project 5962-1969)

Review activities:

Army - MI, SM
Navy - AS, CG, MC, SH, TD
Air Force - 03, 19, 99

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-M-38510/322C	2. DOCUMENT DATE (YYYYMMDD) 2003-07-14
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3. DOCUMENT TITLE MICROCIRCUITS, DIGITAL, BIPOLAR, LOW-POWER SCHOTTKY TTL, HEX BUS DRIVERS WITH 3 STATE OUTPUTS, MONOLITHIC SILICON

4. NATURE OF CHANGE (*Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.*)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (<i>Last, First Middle Initial</i>)	b. ORGANIZATION	
c. ADDRESS (<i>Include Zip Code</i>)	d. TELEPHONE (<i>Include Area Code</i>) (1) Commercial (2) DSN (<i>If applicable</i>)	7. DATE SUBMITTED (YYYYMMDD)

8. PREPARING ACTIVITY

a. NAME Defense Supply Center, Columbus	b. TELEPHONE (<i>Include Area Code</i>) (1) Commercial 614-692-0536 (2) DSN 850-0536
c. ADDRESS (<i>Include Zip Code</i>) DSCC-VA P. O. Box 3990 Columbus, Ohio 43216-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman Road, Suite 2533 Fort Belvoir, Virginia 22060-6221 Telephone (703)767-6888 DSN 427-6888